

BROAD AGENCY ANNOUNCEMENT (BAA)**Demonstration and Evaluation of Technologies for Safety Vehicle(s) using adaptive Interface Technology (SAVE-IT)****1. OVERVIEW**

The John A. Volpe National Transportation Systems Center (VNTSC), an organization within the Research and Special Programs Administration, U. S. Department of Transportation (DOT), is supporting the National Highway Traffic Safety Administration's (NHTSA), Office of Vehicle Safety Research, in its upcoming project to develop, demonstrate, and evaluate the potential safety benefits of technologies and methods that manage the information from various in-vehicle systems (e.g., cell phones, navigation systems, Internet applications, and warning systems) based on real-time monitoring of the roadway environment and the driver's capabilities to attend to the demands of the driving task. The purpose of the program, called Safety VEHICLE using adaptive Interface Technology (SAVE-IT), is to help reduce distraction-related crashes and enhance the effectiveness of collision avoidance systems.

The VNTSC is issuing this BAA to request proposals from Offerors experienced in automotive adaptive interface development, systems integration, human factors research, and the integration of new technologies into fleets of vehicles capable of operating on U.S. highways. Teaming arrangements are encouraged because the Government recognizes that a single firm may not possess the range of capabilities in-house to meet the experience requirements. This BAA is issued under the provisions of the Federal Acquisition Regulation (FAR) Subparts 6.102(d)(2)(i) and 6.102(d), which provides for the competitive selection of research and prototype proposals for scientific study or experimentation directed toward advancing the state-of-the-art or increasing knowledge or understanding.

The VNTSC is interested in receiving proposals for the research program described below. This announcement is an expression of interest only and does not commit the Government to make an award or to pay any Offeror response participation costs. Furthermore, the cost of responding and proposal preparation to a BAA is not an allowable direct charge to any resultant contract.

The Government will consider alternative or optional proposals that meet the overall requirements delineated in this package. Alternative or optional proposals meeting research objectives, but at higher costs, will also be considered if funding becomes available.

2. BACKGROUND

Safety-impacting systems such as wireless phones, navigation devices, entertainment systems, and wireless Internet applications may increase crash risk due to their potential to distract the driver from the driving task. Safety-enhancing systems utilize sensors to detect imminent collisions or other dangerous situations, and warn drivers to take appropriate actions. It is anticipated that drivers in the future will have an increasing number of safety-impacting and safety-enhancing technologies integrated into their vehicles, as stand-alone systems mounted on their vehicles, and as portable hand-held devices. Recognizing that some of these new devices or combinations of them can increase crash risk, the DOT's, National Highway Traffic Safety Administration NHTSA, convened a public meeting to discuss the *Safety Implications of Driver Distraction When Using In-Vehicle Technologies* on July 18, 2000. NHTSA also initiated an Internet Forum on Driver Distraction in the summer of 2000, which included technical papers as well as public comments on driver distraction. Although the Forum is not currently active, the contents are archived and summarized on the NHTSA web page <http://www-nrd.nhtsa.dot.gov/departments/nrd-13/DriverDistraction.html>. The information from the public meeting and Internet Forum were discussed in several subsequent expert working group meetings that addressed research needs to support efforts to understand the distraction safety problem and develop potential countermeasures.

One of the expert working groups' recommendations was to develop an adaptive system that could monitor the moment-to-moment roadway and in-vehicle demands on the driver, integrate the monitored information to determine when drivers are distracted or overloaded, and, then, make adjustments to the driver vehicle interface to prevent a possible crash. The following three components would be included:

- 1) Sensor Array: Monitors and measures activities both inside and outside the vehicle in order to assess the external contributors to driver workload and the driver characteristics indicative of distraction. For example, existing sensors used by collision-warning systems and Global Positioning System (GPS) measurements of location combined with a table of corresponding roadway characteristics could be used to help understand the environment outside the vehicle. Inside the vehicle, sensors could be employed to monitor the driver's visual scanning and glance behaviors, as well as driver interactions with controls and displays.
- 2) Workload/Distracton Manager: Assesses the attentional capacity and focus of the driver based on the relative demands of the outside and inside vehicle tasks. The algorithms for processing the sensor data should be robust enough to work in a variety of roadway/traffic scenarios and for the varying capabilities of the driving population.
- 3) Adaptive Interface: A system for modifying the displays and controls managed by the workload/distracton manager. Possible adaptations include locking out information, prioritizing information, slowing the rate of information presented, providing inattention warnings, changing activation thresholds for collision warnings, or saving messages for display during low driving demand conditions.

The operation must be acceptable to the driving population, and should closely match the driver's mental model of system operation.

There has already been widespread interest in adaptive interface technology to minimize the influence of driver distraction on crash causation. European human factors researchers in the DRIVE Project's Generic Intelligent Driver Support (GIDS) developed a "driver system" with an integrated warning and control device that could prioritize and present information to avoid distracting or overloading the driver. There are also industry efforts underway to develop systems to assist distracted or inattentive drivers. Motorola's "Driver Advocate," a driver assistance interface, monitors the driving workload, estimates the driver's capacity, prioritizes the driver's immediate tasks, and assists the driver with the most urgent tasks (Remboski, 2000). Delphi Automotive Systems' Integrated Safety System (ISS) concept vehicle packages together safety technologies to provide drivers consolidated information during different driving states ranging from normal, requiring a warning, to collision-avoidable and unavoidable. (Buchholz, 2001). Volvo, together with Seeing Machines, is developing a way to monitor driver search and scan behavior using video and image processing software. They plan to enter the driver and vehicle status sensor data into a workload manager (Eisenberg, 2001). The aviation industry uses de-cluttering strategies in complex safety critical display systems, such as aviation head-up displays, electronic charts, and air traffic control displays and these information management schemes may be useful in the automotive industry. (Mykityshyn, 1993) (See Attachment 1 for references).

Much more research needs to be accomplished before a commercial operational system can become available. To support and help speed the development of this potential countermeasure for distraction-related crashes, the Government intends to collaborate with industry to accomplish the necessary research and development to establish the technical understanding and performance requirements required to build operational systems, and demonstrate the effectiveness of SAVE-IT technologies in monitoring and minimizing unsafe driver distractions.

3. OBJECTIVES

The Government invites Offerors to submit proposals for a research program to develop an operational test vehicle platform incorporating adaptive interface technology that integrates in-vehicle and portable technologies to monitor and manage driver workload and distractions. The research program has the following objectives:

- 1) Advancing the deployment of adaptive interface technology as a potential countermeasure for distraction-related crashes;
- 2) Enhancing the effectiveness of collision warning systems by optimizing alarm onset algorithms tailored to the driver's level of workload and distraction;
- 3) Conducting human factors research to help derive distraction and workload measures for use in algorithms for triggering interface adaptation;
- 4) Developing and applying evaluation procedures for assessment of SAVE-IT safety benefits;

- 5) Developing performance requirements for system operation and standards for adaptive interface conventions; and
- 6) Providing the public with documentation of the human factors research and with information describing the algorithms for controlling the driver/vehicle interface to the extent needed for specifying performance and standardization requirements.

4. REQUIREMENTS

To address SAVE-IT Program objectives, this procurement shall consist of two phases. Phase I lays the groundwork for developing operational prototypes for functional evaluation in Phase II.

In Phase I, the Contractor shall perform analyses of which crash scenarios SAVE-IT should be designed to prevent; evaluate available technologies for measuring roadway, traffic, and driver distraction parameters; and conduct the initial human factors research needed to help guide the development of a more detailed SAVE-IT Implementation Plan for Phase II research and development. The SAVE-IT Implementation Plan for Phase II shall describe the research, testing and deliverables to derive the requirements for the integration of both the hardware and algorithms to monitor and manage the in-vehicle information demands on the driver. The SAVE-IT Implementation Plan shall also describe how SAVE-IT could be conducted in multiple stages and what further research is needed to support each stage. Staging the development recognizes that some benefits of SAVE-IT may be achieved in the short term with available sensors and limited research to determine algorithms. As additional research is completed and new sensors and algorithms become available, more advanced and effective stages of technologies identified in the SAVE-IT research program can be deployed and evaluated. As the different stages are developed, they need to be compatible with preceding stages of design. The staged development needs to be planned in a logical manner based on such factors as:

- Safety benefits (the extent to which the SAVE-IT functions can reduce crashes)
- State-of-the-art of sensors and other hardware
- Need for supporting human factors research data
- Practicality and costs to deploy in consumer vehicles

5. PHASE II/CONTRACT OPTION

When Phase I deliverables have been achieved, the Government will have the option to continue with Phase II. The determination to continue with Phase II will depend on the degree to which the SAVE-IT Program objectives are achievable. Based on this assessment, a decision will be made regarding the direction for Phase II in terms of what configurations and supporting research should be pursued to achieve the desired objectives. If the findings suggest that the objectives are not practical or feasible, the Government may decide to terminate the program at the end of Phase I. If the option for Phase II is exercised, this will require the development and evaluation of a prototype SAVE-IT test vehicle platform(s), to be used to conduct experiments on test tracks and on U.S. public roads to help achieve the objectives stated above.

6. TYPE OF CONTRACT

In accordance with FAR Subpart 16.303, the contract (covering both Phases I and II) will be a cost-sharing type contract.

It is the Government's intention to award a contract in accordance with FAR Part 35, Research and Development Contracting. If the Volpe Center obtains Other Transaction authority, the Government may use that authority if appropriate.

7. AVAILABILITY OF FUNDS

The Government funding will be contingent upon annual Fiscal Year appropriations. Currently, it is projected that the Government's contribution to Phase I will be between \$800,000 to \$1,000,000. The Government's contribution for Phase II is planned to be \$2,000,000, subject to congressional appropriations, and the Government's decision to exercise the Phase II option

8. PERIOD OF PERFORMANCE

The period of performance for Phase I will be one year and two years for Phase II.

9. RIGHTS IN TECHNICAL DATA AND COMPUTER SOFTWARE AND PATENT RIGHTS

The resulting contract will include the applicable Rights and Data and Patent Rights clauses.

10. PROPOSAL SUBMISSION REQUIREMENTS

In order to submit a proposal on this research program, information must be submitted in a succinct, logical and easy to understand format. Proposals are limited to forty-five (45) pages exclusive of graphs, charts, photos, facility descriptions, and resumes. All proposals must include cost sharing (as stated below in the Cost Proposal section). Proposals must consist of two separate volumes entitled technical and cost. Proprietary data must be marked as per FAR 52.215-1 Instructions to Offerors – Competitive Acquisition (May 2001) (e) – “*Restriction on disclosure and use of data*. Offerors that include in their proposals data that they do not want disclosed to the public for any purpose, or used by the Government except for evaluation purposes, shall --

(1) Mark the title page with the following legend:

This proposal includes data that shall not be disclosed outside the Government and shall not be duplicated, used, or disclosed -- in whole or in part -- for any purpose other than to evaluate this proposal. If, however, a contract is awarded to this offeror as a result of -- or in connection with -- the submission of this data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the resulting contract. This restriction does not limit the Government's right to use information contained in this data if it is obtained from another source without restriction. The data subject to this restriction are contained in sheets [*insert numbers or other identification of sheets*]; and

(2) Mark each sheet of data it wishes to restrict with the following legend:

Use or disclosure of data contained on this sheet is subject to the restriction on the title page of this proposal.”

Facsimile transmissions or e-mail transmissions will not be accepted. Extraneous attachments such as institutional brochures, reprints, disks, or videotapes will not be evaluated. Cost proposals are not subject to a length limitation.

Proposals shall include:

10.1 Technical Proposal: The technical proposal shall include an Executive Summary (two pages or less), all figures, references, tables charts, and appendices and information that addresses the technical goals, approach, expected results and the level of public access and rights to intellectual rights and data. It is the Government’s intent to be able to allow the public and Government access to the results of this research and data obtained during the research.

The Technical Proposal shall also include the following:

1. Technical Approach for Meeting Program Objectives

Describe proposed research to achieve SAVE-IT, including a realistic technical approach to address the research program objectives. Demonstrate technical capabilities, knowledge and experience to conduct necessary research. Identify research approach that is sound, realistic, clear and practical. Demonstrate the capability to plan and conduct the development and testing necessary to meet the SAVE-IT Program objectives and identify potential challenges and strategies to address them. Define a technical approach which is consistent with the level of difficulty of the problem. Identify proposed tasks that demonstrate an understanding of the steps necessary to achieve objectives. Describe the anticipated deliverables in Phases I and II, recognizing that the resultant data is expected to be a major deliverable.

2. Qualifications of the Offeror’s Team

Provide description of the key project personnel’s (Principal Investigator, and Program Manager) education level, experience, capability, availability and resumes. Describe the proposed key project personnel’s experience, knowledge, and achievements related to automotive adaptive interface research and development, vehicle systems integration, sensor/algorithm development and testing, human factors research, automotive prototype design/development, and related technical areas relevant to the SAVE –IT Program objectives. Describe key project personnel’s qualifications and experience in collecting and applying human factors data to developing practical solutions to deriving requirements for SAVE-IT performance, operation, and evaluation. Describe key project personnel’s skills to communicate clearly through reports, briefings and technical

presentations (i.e., recent publications). Describe relevant experience and capability as a vehicle manufacturer or first tier supplier involved in adaptive interface research.

3. Project Management and Schedule

Provide a brief description of the Offeror's organization and a realistic schedule for accomplishing the research within the program time frame and in a cost effective manner. Provide a description of how the Offeror plans to address leadership, organization, and technical and cost control. Describe the proposed staff and their responsibilities, including the key project personnel and managers of all major tasks. Describe how the project task and administrative activities would be directed and coordinated, including teaming arrangements. Provide a detailed description of the management of the technical components, (i.e., progress reports, milestones, tasks, deliverables) and proposed level of rights in data developed under Phases I and II of this program .

4. Facilities and Equipment

Describe the adequacy and availability of current, and planned, facilities and equipment such as test vehicles, driver performance measurement instrumentation, software, test track, laboratory facilities, and test apparatus. Discuss how the available facilities and equipment meet the needs of the Phase I and II SAVE-IT Program such as prototype development capabilities.

10.2 Cost Proposal: Cost/funding proposals should be organized in two (2) sections in the following order: total project cost, cost sharing in-kind contributions (i.e., cost to the Government and off-budget supporting resources). The cost proposals must cover both Phase I and II. These are described in more detail below.

Section 1 - Total Project Cost: This section will give a detailed breakdown of costs of the project. Cost should also be broken down on a task-by-task basis for each task appearing in the Offeror's technical approach. This should include all of the proposed costs to the Government and cost sharing by the Offeror. The following information should be presented in your proposal for each phase of the effort: total cost of the particular project phase; total Offeror cost share funding requested from the Government; and elements of cost (labor, direct materials, travel, other direct costs, equipment, software, patents, royalties, indirect costs, and cost of money). Sufficient information should be provided in supporting documents to allow the Government to evaluate the reasonableness of these proposed costs, including salaries, overhead, Facilities Capital Cost of Money equipment purchases, fair market rental value of leased items, and the method used for making such valuations. Note that a cost-sharing contract is a cost-reimbursement contract in which the Offeror receives no fee and is reimbursed only for an agreed upon portion of its allowable costs.

Section 2- Cost Sharing and In-Kind Contributions: Proposals should contain sufficient information regarding the sources of the Offeror's cost share so that a determination may be made by the Government regarding the Offeror's availability, timeliness, and control

of these resources. For example: How will the funds and resources be applied to advance the progress of the proposed effort? What is the role of any proposed in-kind contributions?

10.3 General Instructions: If the Offeror's total cost proposal exceeds \$500,000, and the Offeror is a large business, it is required to include a Small, Small Disadvantaged, and Woman Owned Subcontracting Plan with its proposal package in accordance with FAR Clause 52.219-9. The North American Industry Classification System (NAICS) code for this BAA is 54199.

Proposals are due on March 28, 2002, 2:00 P.M. EST. The point of contract (POC) is:

Kathleen Regan, Contract Specialist
(617) 494-3485

Inquiries. Any inquiries or correspondence pertaining to the BAA must be received no later than 14 calendar days after issuance of the BAA. Address all written inquiries to:

U.S. Department of Transportation
RSPA/Volpe National Transportation Systems Center
Attn: Kathleen Regan, DTS-853
55 Broadway, Kendall Square
Cambridge, MA 02142-1093

The envelope must reference the BAA number and the mail code. Questions may also be submitted by email to **regan@volpe.dot.gov** or by facsimile at (617) 494-3024. Any questions received after this date will be answered only if determined by the Contract Specialist to be in the best interest of the Government. **NO ORAL INQUIRIES WILL BE ANSWERED.** No question of any nature or form is to be directed to technical personnel. Any additions, deletions, or changes to this procurement will be made by amendment to the BAA. Each amendment will be identified by number and receipt thereof will be acknowledged by each Offeror. Consistent with the dissemination of the BAA, **any amendment will be posted Fed Biz Opps and on the Volpe Center Acquisition Management Division internet home page** (<http://www.volpe.dot.gov/procure/index.html>) and no paper copies will be mailed to prospective Offerors.

Packages must be clearly labeled with the BAA number and a statement that the contents are "Proposal Data To Be Opened By Addressee Only."

Interested Offerors should send an original and eight (8) copies of their proposals to:

U.S. Department of Transportation
 RSPA/Volpe National Transportation Systems Center
 Attn: Kathleen Regan, DTS-853
 55 Broadway, Kendall Square
 Cambridge, MA 02142

Proposals should be titled and shall identify the Offeror's name, address, telephone and fax numbers and email address. All responsible sources capable of satisfying the Government needs may submit a proposal that will be considered by the Government.

11. EVALUATION CRITERIA

The proposals shall be evaluated to determine the extent of the Offeror's capability to meet the SAVE-IT Program objectives. Offerors shall have expertise in vehicle system integration, hardware/algorithm development, human factors research, and the automotive industry, (i.e., vehicle manufacturers or first tier suppliers).

The Government will evaluate the Offerors' proposals using the following criteria:

1. Technical Approach for Meeting Program Objectives

Offeror addresses Program objectives. Offeror demonstrates technical capabilities, knowledge and experience to conduct research necessary to achieve objectives. Technical approach is sound, realistic, clear and practical. Demonstrates capability to plan and conduct the development and testing necessary to meet objectives. Shows awareness of potential challenges and technical approach demonstrates insight into ways to overcome them. Technical approach is consistent with level of difficulty of the problem. Proposed tasks demonstrate understanding of steps necessary to achieve objectives. Identifies deliverables for Phases I and II, including generated data.

2. Qualifications of the Offeror's Team

The degree to which the key project personnel (Principal Investigator and Program Manager) have relevant education level, experience, capability, and their availability. The degree to which key project personnel have experience, knowledge and achievements related to automotive adaptive interface research and development, vehicle systems integration, sensor/algorithm development and testing, human factors research, automotive prototype design/development, and related technical areas relevant to the SAVE-IT Program objectives. The degree to which key project personnel have qualifications and experience in collecting and applying human factors data to developing practical solutions to deriving requirements for SAVE-IT performance, operation, and evaluation. The degree to which key project personnel have the skills to communicate clearly through reports, briefings and technical presentations. Relevant experience and

capability as a vehicle manufacturer or first tier supplier involved in adaptive interface research.

3. Program Management and Project Scheduling

The completeness and realism of the Offeror's schedule for accomplishing the research within the program time frame and in a cost effective manner. The degree to which the Offeror demonstrates adequate leadership, organization, technical and cost control. Adequacy of identified key project personnel and managers of all major tasks. Capability of Offeror to direct and coordinate project tasks and administrative activities including teaming arrangements. Adequacy of the management of technical components, i.e., progress reports, milestones, tasks, deliverables and proposed level of rights and data developed under Phases I and II of this contract.

4. Offeror's Facilities and Equipment

The adequacy and availability of facilities and equipment, such as test vehicles, driver performance measurement instrumentation, software, test track, laboratory facilities, and test apparatus. The degree to which the available facilities and equipment meet the specific needs of the Phase I and II SAVE-IT program, such as prototype development capabilities.

The above criteria are listed in order of importance. Criterion 1 has significantly greater weight than Criteria 2 through 4. Criterion 2 has greater weight than Criteria 3, and 4. Criterion 3 has greater weight than Criterion 4

12. EVALUATION FOR AWARD - BEST VALUE

The Government will award a contract resulting from this BAA to the responsible Offeror whose offer conforming to the BAA will be most advantageous to the Government, price and other factors considered.

(a) The selection of one contract will be based on the Offeror's technical capability to meet the Government's objectives and offers the best value to the Government within the Government's availability of funds as stated under Paragraph 7, Availability of Funds, of this BAA.

(b) Except when it is determined in accordance with FAR 17.206(b) not to be in the Government's best interests, the Government will evaluate offers for award purposes as follows: The Government will add the amounts for Phase I and Phase II (Option) to determine the total evaluated price. Evaluation of options will not obligate the Government to exercise the option(s).

(c) Order of Importance. The technical evaluation factors stated in the technical proposal when combined are significantly more important than cost in the selection for award of this contract. Offerors are cautioned not to minimize the importance of the cost proposal. The cost evaluation may become more significant when Technical Approach for Meeting Program Objectives, Qualifications of the Offeror's Team, Program Management and Project Scheduling, and Offeror's Facilities and Equipment are closer; when these factors other than cost to the Government are essentially equal, cost to the Government may become the determining factor in making award.

Attachment 1

A. REFERENCES

Buchholz, K. (2001, April 2001). Delphi's ISS Vehicle. aei.
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Eisenberg, A. (2001, April 12). What's Next: Helping Drivers Keep Their Eyes on the Road. New York Times.

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